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ABSTRACT

Pretests and dictation achievement tests were administered to 1,317 first-year shorthand students and 120 second-year students learning Century 21, Forkner, or Gregg shorthand in the Minneapolis-St. Paul area high schools. Forkner shorthand students achieved a higher accuracy and transcription rate during the first year of instruction. Thus, it is suggested that this is the preferred method of instruction for students who are able to devote one year or less to shorthand instruction. However, by the end of the second year Gregg shorthand students had higher accuracy scores and better English error scores, suggesting that this is the preferred method for students who are able to take two years of shorthand instruction. None of the three shorthand systems included in this project resulted in first-year shorthand achievement at vocational skill levels, assuming that mailable letters from dictation at 80 words per minute represents minimum vocational skill. (Complete data tables are included.) (BB)

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FIRST- AND SECOND-YEAR SHORTHAND ACHIEVEMENT FOR CENTURY 21, FORKNER AND GREGG SHORTHAND

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ABSTRACT

Pretests and dictation achievement tests were administered to 1317 first-year shorthand students and 120 second-year students learning Century 21, Forkner and Gregg shorthand in the Minneapolis-St. Paul area high schools. First-year dictation achievement was highest for Forkner shorthand students. At the middle of the second year, Forkner students transcribed their shorthand notes more accurately and more rapidly than did Gregg shorthand students; however, Forkner students had more English errors. At the end of the second year, achievement was higher for Gregg shorthand students, except on transcription rate, which was higher for Forkner students.

The trend of national shorthand enrollments shows that fewer students are taking beginning shorthand in the high school and that an even smaller proportion of these students are continuing with the second year of high school instruction. Many schools, in fact, offer only one year of shorthand instruction. During the 1960-61 school year there were approximately 394,000 students in the first-year course and 154,000 in the second-year course (Tonne & Nanassy, 1970, p. 20). In 1970-71, first-year enrollments were 514,157, and second-year enrollments were 128,114 (Gertler & Barker, 1973, p. 16). Projections for total shorthand enrollments in 1980 are less than the total in 1960 (Nanassy, Malsbary & Tonne, 1977, p. 37), 533,200 students for both years combined.

When a second year of shorthand is available in high school, it may take three or four beginning shorthand classes to make one second-year class. Approximately a quarter of the students in first-year classes have been shown to be seniors who will not be in school the next year (Crank, Crank, Hanrahan, 1971-72; Lambrecht, 1977). A large portion of the juniors in the course frequently do not

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enroll for the second year, either because they have been unsuccessful in the first year or because other electives are more attractive.

Because many of the Minneapolis-St. Paul area high schools can offer only one year of shorthand, many teach Forkner shorthand either as the only system or as an alternative along with Gregg shorthand. The expectations have been that dropouts from shorthand would be less and that first-year achievement would be higher than with Gregg shorthand because Forkner is easier to learn.

A city-wide research project was undertaken in 1975 to see if these expectations were true. All schools known to be teaching Forkner shorthand were asked to participate in the study. Fourteen of these 16 schools agreed to administer the tests. Because two high schools in the Twin Cities area were teaching Century 21 shorthand, these schools were included in the evaluation. Four schools teaching Gregg shorthand only were asked to participate so that the number of students learning Forkner and Gregg shorthand were approximately the same. Table 1 shows the number of students enrolled in beginning shorthand classes in 20 high schools. Approximately 24 percent of the 1317 students were in schools teaching only Forkner shorthand, 15 percent were in schools teaching only Gregg shorthand, half were in schools offering both Forkner and Gregg shorthand, 7 percent were in schools where both Century 21 and Gregg were taught, and 4 percent were in a school teaching only Century 21 shorthand.

Table 2 shows the number and percent of students who withdrew from shorthand before the end of the first school year. These dropouts were identified by the teachers of these classes. The students' reasons for withdrawing were not determined. A total of 55 students were enrolled in Forkner shorthand classes offered for only one semester, and these students were not considered to be dropouts.

Chi-square analysis of the dropouts from the three shorthand systems both at the middle of the school year and by the end of the year showed that there

were no significant differences among Century 21, Forkner and Gregg students at the $p < .05$ level. The proportion of students who completed the first year of shorthand, therefore, did not differ for the three systems.

Of the 20 high schools participating in the first-year achievement testing, nine did not offer second-year shorthand the following year. Of the 11 schools which did offer a second-year course, two offered only a third semester. Three others did not wish to continue with the achievement testing. The remaining six schools continued with the testing. A total of 79 Gregg and 40 Forkner students were included. There were no Century 21 students in the second-year classes.

Table 3 shows the enrollments over two years in the six schools which participated in the second-year testing. Chi-square analysis showed that during the first year there were significantly more students retained in the Forkner classes than in the Gregg classes at the middle of the year, but at the end of the year there was no difference. The proportion of seniors enrolled in each system was not different at the end of the first year. When the seniors were excluded, a significantly larger percent of Gregg students (52.0 percent) than Forkner students (31.3 percent) continued into the second-year classes.

At the end of the second year, 13 Gregg students in one school were eliminated from the study because the teacher did not think they could take the dictation. These students had been using a simulated office practice set during the last half of the year. The loss of these students, therefore, together with 13 dropouts in the other schools reduced the number of Gregg students to 53 at the end of the second year.

The second-year sample of students was considerably smaller than that available for the first-year testing. Since these classes were not selected randomly, it is not possible to generalize the findings to Forkner and Gregg shorthand

students in the Minneapolis/St. Paul area as a whole, nor to other areas. The findings presented need to be replicated in other second-year shorthand classes.

The following sections of this article describe the procedures followed in conducting the achievement testing, the findings of the study, and the conclusions and recommendations for teaching.

Procedures

This section describes the pretests, the dictation tests, the scoring procedures, and the data analyses.

Pretests

Four pretests were administered to control for any differences in students' initial abilities when comparing their shorthand achievement. These tests were the Revised Byers' Shorthand Aptitude Test (Lambrecht, 1971), the Thorndike 20-Word Vocabulary Test (Buros, 1965), a spelling test (Casady, 1973), and a revision of the Cooperative English Test (Casady, 1973).

Analyses of variance showed that there were no significant differences among students learning the three shorthand systems on any of the pretest measures. Because the Revised Byers' Shorthand Aptitude Test had the highest correlation with shorthand achievement scores, it was used as a covariate in the subsequent achievement analysis. The effect of such a covariate would be to increase the efficiency of the analysis of variance through a reduction of error variance in the achievement scores (Kennedy, 1977).

Shorthand Dictation Achievement Tests

Shorthand achievement was measured by administering a series of dictation tests at three speeds at the middle and end of both the first and second years of instruction. At the middle of the first year, or when students had completed the introduction of the shorthand theory if later than the middle of the year,

the three dictation speeds were 50, 60 and 70 wpm. At the end of the first school year, these rates were 60, 70 and 80 wpm; at the middle of the second year, 70, 80 and 90 wpm; and at the end of the second year, 80, 90 and 100 wpm. Except for the actual letters used, the dictation material and procedures were similar each time.

On each of three days, one letter containing approximately 100 standard shorthand words was dictated at each of the three dictation speeds. The tests were recorded on tape to maintain consistency of the dictation in all schools.

On each of the three testing days, teachers played the taped dictation which included a short "warm-up" letter at the middle dictation rate. After the test dictation, students transcribed the letter at the lowest dictation speed and proceeded to the highest. During the first year transcription could be either in longhand or at the typewriter; during the second year all transcription was typed. As each letter was completed, students were to raise a hand so that the teacher could record the elapsed time on each letter.

Test Scoring Procedures

The test scoring procedures were the same for all of the test administrations. Three scores were obtained for each student at each of the dictation speeds: percent of accuracy of the transcript; percent of English errors in the transcript; and transcription rate. These three scores will be briefly explained together with their reliability.

Percent of accuracy. The first score determined on each letter was the percent of actual words dictated which were transcribed correctly. Only omissions or incorrect words were counted as errors. Added words, incorrect spelling, or typewriting errors were not counted as errors. The number of correct words was divided by the number of actual words dictated to obtain the percent of accuracy for each letter. For the three letters at the same dictation speed, the percent

of accuracy scores were averaged to yield one percent of accuracy score at each speed.

Percent of English errors. After the letters had been scored for accuracy of the transcript as described above, the correct words on each transcript were scored for English errors, including: incorrect spelling, punctuation, word division, capitalization, number expression, or unusually messy erasures. The total number of English errors made at each dictation rate was divided by the number of actual words transcribed correctly by each student to yield a percent of English error score.

Transcription rate. The time required to transcribe each letter was divided by the number of actual words transcribed correctly to yield a correct-word-per-minute (cwpm) score for each student at each dictation rate.

Reliability of achievement scores. Test-retest reliability data were collected at each of the first-year dictation rates from four shorthand classes which were not part of the achievement study. Enrollment in these four classes ranged from 12 to 37 students. Three of the classes were second-year shorthand students, since first-year classes could not write the dictation in the fall of the school year. The 50 wpm dictation was written by first-year students at the middle of the school year.

The percent of accuracy scores and the transcription rate scores were more reliable than the percent of English error scores. The reliability coefficient for the percent of accuracy scores ranged from $r = .70$ to $r = .93$; for transcription rate, the range was from $r = .67$ to $r = .92$; for percent of English error scores, the range was from $r = .51$ to $r = .75$.

Data Analysis

The findings reported here were obtained through one-way analysis of variance. Two-way analysis of variance was carried out when the students were categorized by the type of transcript prepared (longhand or typewritten) as well as by shorthand system learned. One- and two-way analyses of covariance were carried out using the Revised Byers' Shorthand Aptitude Test as the covariate. Because the findings from the two-way analyses of variance and the covariance analyses were not different from the results of the one-way analyses of variance, the findings from the latter analyses are the only ones presented here.

The $p < .05$ level of significance was chosen as that at which differences would be recognized. The actual probability levels of the F ratios are presented in the tables so that others may choose different levels of significance if they wish.

Findings

Findings are presented for the middle and end of the first and second years of shorthand instruction.

Comparison of Middle-of-First-Year Achievement

The mean percent of accuracy scores for Century 21, Forkner and Gregg shorthand are presented in Table 4 for the middle-of-the-first-year tests. Analyses of variance showed that significant differences existed at each dictation rate. The Scheffe procedure was used to identify those means which were different, and in each instance Forkner shorthand had the highest mean scores and Gregg shorthand the lowest. The highest average percent of accuracy on the lowest dictation rate, 50 wpm, was approximately 80 percent for Forkner shorthand students.

The mean percent of English error scores for each system are shown in Table 5 with the results of the analyses of variance. Significant differences

existed at all dictation speeds with Century 21 shorthand having the highest percent of English error (lowest achievement) and no differences existing between Gregg and Forkner shorthand.

The mean transcription rate scores are shown in Table 6 with the analyses of variance results. Significant differences at each dictation rate showed Forkner shorthand students to have the highest transcription rates.

Comparison of End-of-First-Year Achievement

The mean achievement scores for each shorthand system are shown in Table 7 for the end-of-the first-year percent of accuracy scores. One-way analyses of variance showed that significant differences existed at 60 and 70 wpm favoring Forkner shorthand. There were no differences among the three systems at 80 wpm. All students could read an average of 66 percent of their notes from the 80 wpm dictation.

Table 8 summarizes the results of analyses of variance on the percent of English error scores. Significant differences were found at both 60 and 70 wpm where Forkner had the highest percent of error (lowest achievement).

Differences among the three systems were found at each dictation speed for transcription rate. Table 9 shows the mean transcription rates for each system and the analyses of variance summaries. Forkner shorthand students had the fastest transcription rates at each dictation speed.

Comparison of Middle-of-Second-Year Achievement

The second-year achievement testing included a much smaller sample of students all of whom were in one of six high schools teaching Gregg or Forkner shorthand. The mean percent of accuracy scores and the results of the analyses for middle-of-the-second-year tests are shown in Table 10. At the 70 and 80 wpm dictation rates there were significant differences between the two systems with

Forkner students being higher. The reverse was true of the percent of English error scores at the middle of the second year, as shown in Table 11. Forkner students had the higher percent of English error scores (lower achievement) on the 70 wpm dictation.

The mean transcription rates on the 80 and 90 wpm dictation were significantly higher for Forkner shorthand students, as shown in Table 12.

Comparison of End-of-Second-Year Achievement

At the end of the second year the results were different from any of the previous findings. Table 13 shows that Gregg shorthand students had significantly higher percent of accuracy scores at each of the dictation rates, 80, 90 and 100 wpm. Gregg students also had significantly lower (better) percent of English error scores at each dictation rate (Table 14).

In one respect the end-of-second-year findings were consistent with previous results. Forkner shorthand students had significantly higher transcription rates at each dictation speed (Table 15).

Conclusions and Recommendations

The following conclusions and recommendations have been drawn from the above findings.

1) Forkner shorthand students achieved significantly higher percent of accuracy and transcription rate scores consistently during the first year of instruction. It is therefore recommended that if students are able to devote one year or less to shorthand instruction, Forkner shorthand should be offered because it is likely to result in higher achievement for the majority of students in this amount of time than will Gregg shorthand.

2) During the second year of instruction Forkner shorthand students continued to show the advantage of being able to transcribe their notes more quickly. They

further transcribed their notes more accurately than Gregg shorthand students at the middle of the second year, but less accurately than Gregg students at the end of the second year. Forkner students also made more English errors than Gregg students at both second-year testing times. The reason for this latter finding may be the lack of second-year instructional materials for Forkner shorthand. Two recommendations are therefore made:

a) If students are able to take two years of shorthand instruction, Gregg shorthand should be offered because by the end of two years higher dictation speeds are likely to be attained by the majority of students than with Forkner shorthand.

b) Because Forkner shorthand students consistently were shown to achieve poorer percent of English errors scores during the second year, attention should be given to the amount of review and practice of English style elements that is available in Forkner shorthand instructional materials for the second year of instruction.

3) None of the three shorthand systems included in this project resulted in first-year shorthand achievement at vocational skill levels, assuming that mailable letters from dictation at 80 wpm represents minimum vocational skill. Three recommendations are made as a result of this finding:

a) If Forkner shorthand is taught for one year only or for more than one year, improved instructional materials should be available which give more systematic attention to English style review and dictation skill building. This was the one area in which Forkner students were shown to achieve significantly lower scores than Gregg students. Instructional methods were not controlled in this project, and it may be in this area that changes could be made to raise the one-year achievement levels for all students.

b) For the average student learning Gregg shorthand, more than one year of instruction should be recommended.

c) If only one year of instruction is to be available in Gregg shorthand, students should be selected for this course based upon their verbal ability and interest in learning shorthand. Further support for this recommendation can be found in the complete research report in which shorthand aptitude test findings are presented.

The findings of this study have confirmed those of several earlier studies (Smith, 1966; Hadfield, 1975; Oross, 1976; and Whitman, 1977), that Forkner shorthand does result in higher achievement at the end of one year of instruction compared with Gregg shorthand. This study also shows, however, what many shorthand teachers have suspected, that after two years of instruction Gregg shorthand results in the attainment of higher writing rates than does Forkner shorthand. This second-year finding was obtained on a much smaller sample than was the first-year finding, and replication of the second-year evaluation is necessary.

The main implication of both findings is that different shorthand systems should be available to meet the needs of different students. These may be students with different abilities, students willing to spend different amounts of time learning shorthand, and also students with different goals for learning the subject, such as personal use or job use. Choosing a shorthand system to teach should not be an "either-or" decision based solely upon teacher preference. It should be a decision which recognizes the needs and interests of students as well as the more commonly occurring reality of being able to offer only one year of shorthand instruction.

Table 1

Sample Size
Beginning Shorthand

System Taught	Sample Size						Total	
	Century 21		Forkner		Gregg			
	n	%	n	%	n	%	n	%
Forkner Only			315	23.9			315	23.9
Gregg Only					196	14.9	196	14.9
Century 21 Only	55	4.2					55	4.2
Forkner & Gregg			286	21.7	369	28.0	655	49.7
Century 21 & Gregg	23	1.7			73	5.5	96	7.3
Total	78	5.9	601	45.6	638	48.4	1317	100.0

Table 2

Dropouts from Beginning Shorthand
Middle- and End-of-Year

Time of Year	System			Total
	Gregg	Forkner	Century 21	
Beginning of Year	638	601	78	1,317
*Dropouts by Middle of Year	144	148	26	320
% of Total Sample	22.6 %	24.6 %	33.3 %	24.3 %
**Cumulative Dropouts by End of Year	170	158	27	355
% of Total Sample	26.7 %	28.9 %	34.6 %	28.1 %
1 Semester Students, Not Dropouts	0	55	0	55
Total End-of-Year Sample	468	388	51	907

*Chi-square value = 4.54 with 2 d.f., n.s.d. at $p < .05$.

**Chi-square value = 1.44 with 2 d.f., n.s.d. at $p < .05$.

Table 3

Shorthand Enrollment in Six High Schools

System	First Year						Second Year			
	Beginning of Year		Middle of Year[a]		End of Year[b]		Middle of Year		End of Year	
	n	%	n	%	n	%	n	%	n	%
Forkner	*249	100.0%	214	85.9%	154	**75.9%	40	**19.5%	39	**19.0%
Gregg	271	100.0%	216	79.7%	186	68.6%	79	29.2%	***66	24.4%
Forkner - Seniors[c]	*49	19.7% of 249			26	16.9% of 154				
Gregg - Seniors	48	17.7% of 271			34	18.3% of 186				
Forkner, Excluding Seniors[d]					128	100.0%	40	31.3%	39	30.0%
Gregg, Excluding Seniors					152	100.0%	79	52.0%	66	43.4%

*Includes 44 students (17 seniors) in one-semester Forkner classes.
**Based on n of 205 (249-44), Forkner enrollment excluding one-semester students.
***Includes 13 students in one school not participating in end-of-year testing.

[a] Chi-square value = 4.31, 1 d.f., s.d. at $p < .05$ (middle-of-year dropouts less for Forkner)
[b] Chi-square value = 2.41, 1 d.f., n.s.d. at $p < .05$ (end-of-year dropouts not different)
[c] Chi-square value = 0.11, 1 d.f., n.s.d. at $p < .05$ (percent of seniors at end of year not different)
[d] Chi-square value = 11.17, 1 d.f., s.d. at $p < .05$ (percent continuing to 2nd year greater for Gregg)

Table 4

Middle-of-First-Year
Shorthand Dictation Tests at 50, 60 and 70 wpm
Means, Standard Deviations and Analysis of Variance Summary
Percent Accuracy

Measure	System			ANOVA		Scheffe Analysis	
	Gregg	Forkner	Century 21	F Ratio	F Prob	Highest Achievement	Lowest Achievement
50 wpm							
n	529	507	55				
$\bar{x}$	63.6%	79.8%	73.8%	112.4	0.000	F	G
s.d.	18.4	16.2	18.5				
60 wpm							
n	506	503	56				
$\bar{x}$	53.5%	69.5%	62.5%	95.1	0.000	F	G
s.d.	18.2	18.7	20.3				
70 wpm							
n	501	479	56				
$\bar{x}$	41.7%	54.7%	49.1%	77.2	0.000	F	G
s.d.	15.3	17.5	15.9				

Table 5

Middle-of-First-Year
Shorthand Dictation Tests at 50, 60 and 70 wpm
Means, Standard Deviations and Analysis of Variance Summary
Percent English Error

Measure	System			ANOVA		Scheffe Analysis	
	Gregg	Forkner	Century 21	F Ratio	F Prob	Highest Achievement	Lowest Achievement
50 wpm							
n	529	507	55				
$\bar{x}$	8.7%	8.3%	11.2%	11.6	0.000	G & F	C 21
s.d.	4.0	4.3	5.2				
60 wpm							
n	506	503	56				
$\bar{x}$	10.3%	10.4%	12.9%	6.4	0.002	G & F	C 21
s.d.	5.5	4.9	5.4				
70 wpm							
n	501	478	56				
$\bar{x}$	7.7%	7.7%	12.4%	33.0	0.000	G & F	C 21
s.d.	4.3	3.8	6.1				

Table 6

Middle-of-First-Year
Shorthand Dictation Tests at 50, 60 and 70 wpm
Means, Standard Deviations and Analysis of Variance Summary
Transcription Rate

Measure	System			ANOVA		Scheffe Analysis	
	Gregg	Forkner	Century 21	F Ratio	F Prob	Highest Achievement	Lowest Achievement
50 wpm							
n	517	488	55				
$\bar{x}$	10.3 wpm	12.4 wpm	9.4 wpm	13.0	0.000	F	G & C21
s.d.	4.0	9.5	4.1				
60 wpm							
n	495	479	55				
$\bar{x}$	10.0 wpm	11.4 wpm	8.7 wpm	22.7	0.000	F	C21
s.d.	3.6	4.2	3.8				
70 wpm							
n	490	466	55				
$\bar{x}$	10.2 wpm	11.1 wpm	8.8 wpm	12.2	0.000	F	C21
s.d.	3.8	4.2	3.4				

Table 7

End-of-First-Year
Shorthand Dictation Tests at 60, 70 and 80 wpm
Means, Standard Deviations and Analysis of Variance Summary
Percent Accuracy

Measure	System			ANOVA		Scheffe Analysis	
	Gregg	Forkner	Century 21	F Ratio	F Prob	Highest Achievement	Lowest Achievement
60 wpm							
n	468	388	51				
$\bar{x}$	89.6 %	91.9 %	86.1 %	8.1	0.000	F	G & C21
s.d.	11.5	9.6	19.7				
70 wpm							
n	467	385	50				
$\bar{x}$	78.9 %	83.0 %	77.3 %	8.4	0.000	F	G & C21
s.d.	16.4	18.3	21.0				
80 wpm							
n	453	375	48				
$\bar{x}$	67.5 %	68.2 %	64.8 %	0.8	0.000	C21, F, & G	
s.d.	18.4	18.3	21.0				

Table 8

End-of-First-Year
Shorthand Dictation Tests at 60, 70 and 80 wpm
Means, Standard Deviations and Analysis of Variance Summary
Percent English Error

Measure	System			ANOVA		Scheffe Analysis	
	Gregg	Forkner	Century 21	F Ratio	F Prob	Highest Achievement	Lowest Achievement
60 wpm							
n	468	388	51				
$\bar{x}$	4.6 %	5.2 %	3.8 %	7.3	0.001	G & C21	F
s.d.	2.9	3.1	2.1				
70 wpm							
n	467	385	50				
$\bar{x}$	5.9 %	6.6 %	5.9 %	4.3	0.014	G & C21	F
s.d.	3.2	3.6	3.5				
80 wpm							
n	453	375	48				
$\bar{x}$	7.9 %	8.4 %	7.5 %	2.3	0.096	C21, F, & G	
s.d.	4.0	4.1	3.9				

Table 9

End-of-First-Year
Shorthand Dictation TEsts at 60, 70 and 80 wpm
Means, Standard Deviations and Analysis of Variance Summary
Transcription Rate

Measure	System			ANOVA		Scheffe Analysis	
	Gregg	Forkner	Century 21	F Ratio	F Prob	Highest Achievement	Lowest Achievement
60 wpm							
n	453	377	50				
$\bar{x}$	14.6 wpm	15.4 wpm	10.8 wpm	20.9	0.000	F	C 21
s.d.	4.5	5.1	4.8				
70 wpm							
n	451	373	50				
$\bar{x}$	13.4 wpm	14.7 wpm	10.9 wpm	25.9	0.000	F	C 21
s.d.	3.7	4.3	4.4				
80 wpm							
n	444	361	46				
$\bar{x}$	12.1 wpm	13.3 wpm	9.5 wpm	28.4	0.000	F	C 21
s.d.	3.4	3.7	3.3				

Table 10

Middle-of-Second-Year
Shorthand Dictation Tests at 70, 80 and 90 wpm
Means, Standard Deviations and Analysis of Variance Summary
Percent of Accuracy

Measure	System		ANOVA	
	Gregg	Forkner	F Ratio	F Prob
70 wpm				
n	79	38		
$\bar{x}$	90.7 %	94.6 %	4.6	0.034
s.d.	10.7	5.7		
80 wpm				
n	79	39		
$\bar{x}$	84.2 %	89.5 %	4.0	0.049
s.d.	15.0	9.9		
90 wpm				
n	79	39		
$\bar{x}$	76.8 %	81.9 %	2.9	0.089
s.d.	16.6	12.3		

Table 11

Middle-of-Second-Year
Shorthand Dictation Tests at 70, 80 and 90 wpm
Means, Standard Deviations and Analysis of Variance Summary
Percent of English Error

Measure	System		ANOVA	
	Gregg	Forkner	F Ratio	F Prob
70 wpm				
n	79	38		
$\bar{x}$	2.5 %	3.3 %	4.0	0.048
s.d.	2.0	1.9		
80 wpm				
n	79	39		
$\bar{x}$	3.7 %	4.6 %	1.8	0.188
s.d.	3.1	3.3		
90 wpm				
n	79	39		
$\bar{x}$	4.7 %	5.8 %	2.9	0.090
s.d.	3.1	3.5		

Table 12

Middle-of-Second-Year
Shorthand Dictation Tests at 70, 80 and 90 wpm
Means, Standard Deviations and Analysis of Variance Summary
Transcription Rate

Measure	System		ANOVA	
	Gregg	Forkner	F Ratio	F Prob
70 wpm				
n	79	38		
$\bar{x}$	13.0 wpm	14.2 wpm	2.9	0.090
s.d.	3.5	3.6		
80 wpm				
n	79	39		
$\bar{x}$	10.6 wpm	13.3 wpm	18.6	0.000
s.d.	2.9	3.6		
90 wpm				
n	79	39		
$\bar{x}$	11.1 wpm	13.4 wpm	14.0	0.000
s.d.	2.9	3.7		

Table 13

End-of-Second-Year
Shorthand Dictation Tests at 80, 90 and 100 wpm
Means, Standard Deviations and Analysis of Variance Summary
Percent of Accuracy

Measure	System		ANOVA	
	Gregg	Forkner	F Ratio	F Prob
80 wpm				
n	53	38		
$\bar{x}$	98.4 %	92.6 %	27.5	0.000
s.d.	1.8	7.9		
90 wpm				
n	53	37		
$\bar{x}$	91.4 %	79.4 %	23.4	0.000
s.d.	8.1	15.2		
100 wpm				
n	53	37		
$\bar{x}$	86.1 %	69.7 %	28.0	0.000
s.d.	11.6	17.6		

Table 14

End-of-Second-Year
Shorthand Dictation Tests at 80, 90 and 100 wpm
Means, Standard Deviations and Analysis of Variance Summary
Percent of English Error

Measure	System		ANOVA	
	Gregg	Forkner	F Ratio	F Prob
80 wpm				
n	53	38		
$\bar{x}$	2.7 %	4.3 %	14.4	0.000
s.d.	1.3	2.5		
90 wpm				
n	53	37		
$\bar{x}$	2.2 %	3.3 %	13.1	0.000
s.d.	1.2	1.7		
100 wpm				
n	53	37		
$\bar{x}$	2.2 %	3.4 %	9.9	0.002
s.d.	1.2	2.4		

Table 15

End-of-Second-Year
Shorthand Dictation Tests at 80, 90 and 100 wpm
Means, Standard Deviations and Analysis of Variance Summary
Transcription Rate

Measure	System		ANOVA	
	Gregg	Forkner	F Ratio	F Prob
80 wpm				
n	53	38		
$\bar{x}$	14.3 wpm	18.5 wpm	12.5	0.001
s.d.	4.7	6.7		
90 wpm				
n	53	37		
$\bar{x}$	13.0 wpm	15.4 wpm	7.1	0.009
s.d.	3.6	5.0		
100 wpm				
n	53	37		
$\bar{x}$	12.1 wpm	14.5 wpm	7.2	0.009
s.d.	3.5	4.9		

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